# A NEW METHOD

Of PROPAGATING

# FRUIT-TREES

AND

# FLOWERING SHRUBS:

WHEREBY

The common KINDS may be raiſed more
expeditiouſly; and ſeveral curious EXOTICS
propagated, which will not take Root from
CUTTINGS or LAYERS.

Confirmed by repeated and ſucceſsful EXPERIENCE.

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Gardener to WILLIAM THOMSON, Eſq;
*at Elſham in Lincolnſhire.*

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G.R. III
BR. MUS.

# A NEW METHOD Of PROPAGATING TREES and SHRUBS.

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## CHAP. I.

## *The* Occaſion *and* Purpoſe *of this Work.*

THE difficulty of propagating ſome ſhrubs in the common way, and the ſmall increaſe that can be made from others by all the uſual methods, brought it into my thoughts to try whether ſome expeditious manner could not be invented of raiſing a large number.

EVERY NURSERYMAN will be glad to know this; for if he can, when he has got a new ſhrub, raiſe twenty or thirty inſtead of three or four, it will be a great increaſe for his profit: and in the ſame way, a GENTLEMAN, when ſuch a thing falls into his hands, will be better pleaſed to ſupply all his friends at once, than a few at a time, and not oblige all under the compaſs of many years. I thought the thing might be done, and that made me reſolve not to be diſheartened at one or two trials: and my honoured maſter has encouraged me; by giving me opportunities to make the experiments, and looking upon their progreſs himſelf.

It is about a year ſince I began the experiments; and between that time and this, I have tried them various ways upon four-and-twenty kinds of trees and ſhrubs of the fruit and flowering kinds; not truſting to one or two ſamples of each, but uſing ſeveral dozen of every kind, and trying them in all the different conditions of culture, according to their nature, from the ſtove to the open air. By theſe means the experiments amounted to many hundreds; and as I kept a conſtant journal of them all, which I have here faithfully tranſmitted to the public, every one will ſee how far each method ſucceeded, and which deſerves the preference.

## CHAP. II.

### *Of* PROPAGATION *by the* BUD.

THE propagation of trees by layers and cuttings, ſhews, that if a piece of any kind be planted in the ground in ſuch manner that it takes root below, the upper part will ſoon furniſh all the reſt, and become a perfect tree. If roots can be thus obtained, the reſt follows in the courſe of nature.

But this is not univerſal; for ſome trees will not take root in either of theſe ways: and if they would, ſtill the number is but ſmall that can be obtained by them, becauſe it is but a certain part of the branches a tree can ſpare for that purpoſe.

On examining the cuttings which have failed, I have always found that the miſchance happened by the rotting of that part of the cutting which was expected to ſend forth the roots: for the danger is when it has been freſh cut, and has no bark to cover it. I thought it natural, that if a method were uſed to keep that part from decay, all thoſe cuttings would grow, which we uſually ſee fail: and communicating my thoughts to a gentleman of knowledge, he not only confirmed my opinion by his own, but gave me a receipt for preſerving the ends of cuttings from rotting: and deſired me to try it afterwards upon ſmaller pieces than ſuch as are commonly uſed; and upon ſingle buds.

Every leaf upon the branch of a tree or ſhrub, has uſually a young bud in its boſom; and it is certain each of theſe buds has in it the rudiment of a tree of the ſame kind: therefore it appeared reaſonable to think that every branch might afford as many new plants as there were leaves upon it, provided it were cut into ſo many pieces, and this ſame dreſſing could prevent the raw ends of each piece from decaying. The advantage of ſuch a practice appeared very plainly, for it muſt give many plants for one, and the thing ſeemed ſo agreeable to reaſon, that I reſolved to try it.

MANY mixtures of reſinous ſubſtances have been propoſed on this head, under the names of cements and vegetable mummies, by Agricola and others; but the very beſt, upon careful and repeated experience, I have found to be this:

MELT together, in a large earthen pipken, two pound and a half of common *pitch*, and half a pound of *turpentine*. When they are melted, put in three quarters of an ounce of powder of *aloes*; ſtir them all together; and then ſet the matter on fire; when it has flamed a moment, cover it up cloſe, and it will go out: then melt it well, and fire it again in the ſame manner. This muſt be done three times: it muſt be in the open air, for it would fire a houſe; and there muſt be a cover for the pipkin ready. After it has burnt the laſt time, melt it again, and put in three ounces of yellow wax ſhred very thin, and ſix drams of maſtich in powder. Let it all melt together till it is perfectly well mixed; then ſtrain it through a coarſe cloth in a pan, and ſet it by to cool.

When this is to be uſed, a piece of it muſt be broke off, and ſet over a very gentle fire in a ſmall pipkin: it muſt ſtand till it is juſt ſoft enough to ſpread upon the part of the cutting where it is wanted, but it muſt not be very hot. It is the quality of this dreſſing to keep out wet entirely. The part which is covered with it, will never decay while there is any principle of life in the reſt; and this being ſecured, nature will do the buſineſs of the growing. This I have found true in practice: and by repeated trials, in more kinds than one, I have found that I could raiſe from any piece of a branch, as many good plants as there were leaves upon it.

NOVEMBER the third, 1757, I took off four dozen leaves of the common LAUREL, with the bud entire in the boſom of each leaf; and every thing being in readineſs, I cut the wounded part ſmooth, wiped it dry, and covered it with ſome of the dreſſing. I planted them in four pretty large pots, one dozen in each. The mould in theſe pots was made extremely fine; and I planted them by making very ſmall openings, and letting in the baſe of the leaf juſt ſo far that the top of the bud might not be wholly excluded from the benefit of the air. I gathered the fine mould carefully about each bud, and preſſed it every way cloſe, to keep the bud in its upright poſition, and prevent the air from coming too eaſily to the part whence the growth of fibres was to be expected.

pected. This was the management of the buds in all the pots.

One pot I ſet up to the rim in garden mould under a warm ſouth wall; another I ſet in the ſame manner, but without that ſhelter; the third I ſet in the green-houſe, and the fourth in the ſtove. The intent of theſe different places, was to ſee what effect ſuch variation would take in the growth; the ſtove naturally inclining all things to ſhoot ſooner.

I gave every one of them the ſame care and attendance that it was natural to allow to young plants; and no other. They had waterings in the common courſe, and thoſe in the open air were ſheltered by peas-ſtraw in the ſeverity of the winter.

I examined them January the fourth. Every bud in the pot which was in the ſtove had formed a good plant two inches high, and with ſufficient roots.

Those in the open air were alive, but had made ſmall progreſs. I examined theſe laſt again April the 12th, and almoſt all of them had made ſhoots, and had got good root, and were in a fair growing condition.

These plants require only the common care afterwards. They are to be removed into a nurſery-bed at ſeven inches high; and they will thus make, by a quick growth, ſo many handſome ſhrubs.

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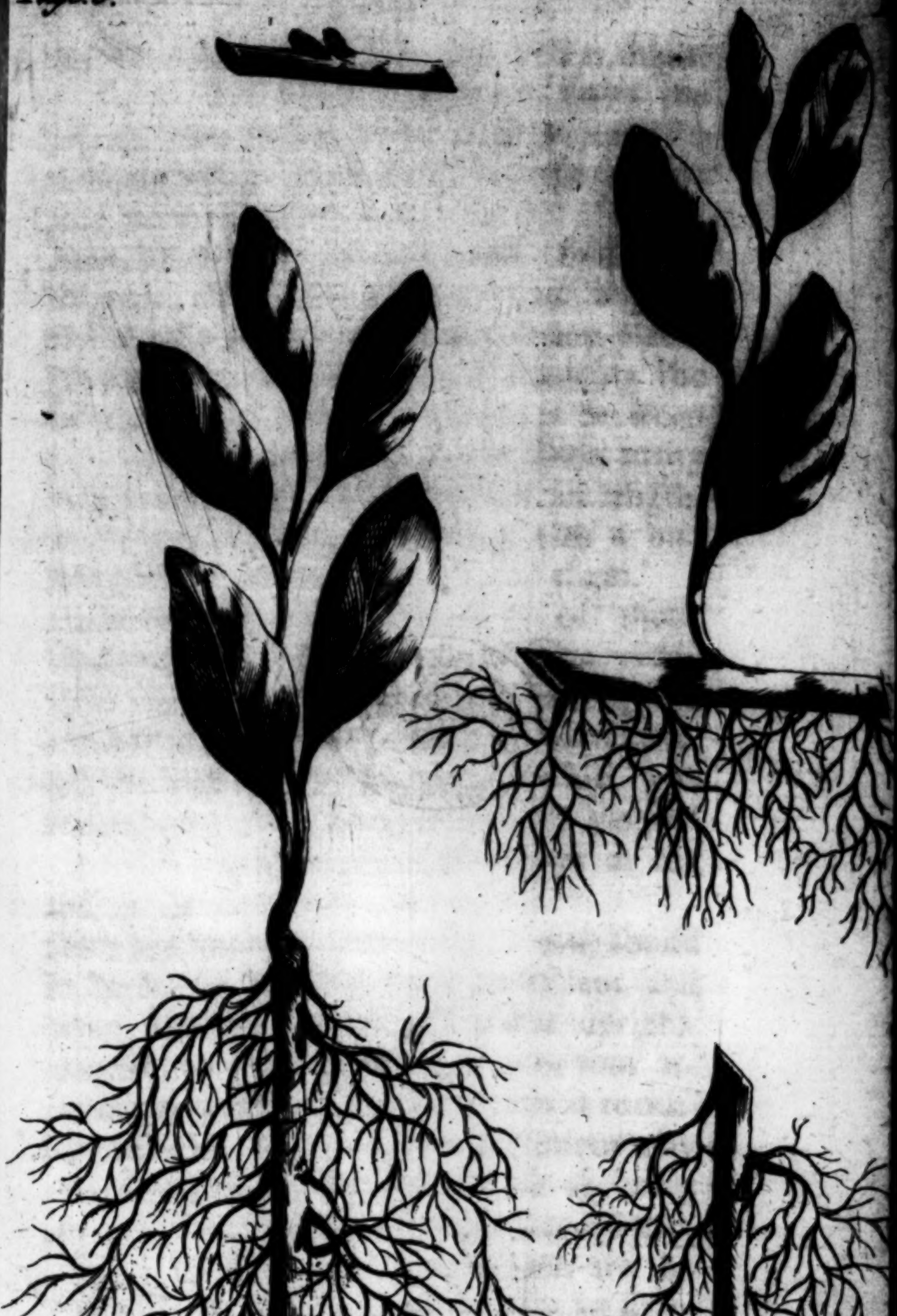

Propagation by the Bud, and by the Branch.

Thus I found that as many plants might be obtained as there were buds upon the branch. The experiment may be uſed to hardy trees of more value, and the benefit of it is very plain.

March 5, 1757, I took off a branch of a white poplar, on which were a great many buds. I cut this into as many pieces as there were buds upon it, cutting the branch through at equal diſtances between every two buds. I thus had a great many pieces of it, each about an inch in length, with the two ends raw, and with a bud nearly in the middle between them. I ſmoothed the wounded ends of theſe, and having ſome of the dreſſing ready melted, I wiped them very dry, and ſpread it all over the cut part of each extremity, leaving the reſt of the piece, which was covered with the bark, naked. I planted them in pots in the ſame manner as the buds of laurel.

April 29, I examined theſe, and found they had produced ſo many excellent and healthy plants; every plant was upright, ſtraight, well-looking, and three or four inches high; and they had all very good roots.

It is eaſy to ſee how this experiment may be extended; and perhaps there are very few hardy ſhrubs which will not ſucceed happily by it. The laws of vegetation are the ſame, whether the plant come from an Engliſh ditch-ſide, or the edge of an American lake; from the hills of one of theſe countries, or the mountains of the other: nor is there any reaſon to ſuppoſe thoſe from warmer climates will refuſe this courſe of propagation in the ſtoves wherein we keep them.

IF this prove true upon experience, which I have happily found in ſome late inſtances, here is a method of increaſe which may be extended to all trees and ſhrubs that have buds, and we ſhall be able to raiſe much greater numbers, and with much more eaſe, than by any way that is yet known. It became me to try the experiment itſelf upon the eaſieſt ſubjects, and ſuch as were moſt likely to ſhew its ſucceſs: for the enquiry was, whether this could be brought about in nature. Others may aſſiſt in the extending the experiments to more kinds: 'tis certain the principles of vegetation allow of it.

AT THE SAME TIME that I prepared theſe buds of the poplar juſt named, with the parts of the entire branch, I took off ſome others with only ſo much of the wood as was ſufficient to keep them entire; not cutting the branch through, but only taking the buds from the ſide of it with a ſmall piece of the bark and wood. I ſmoothed theſe parts, wiped them dry, covered them with the dreſſing, and planted them in pots, in the ſame manner, and with the ſame care as the others. They had all the ſame advantages, but the ſucceſs was not equal. Some of them made very good plants, but others failed: nor were the plants produced from thoſe which ſucceeded, nearly ſo fine as thoſe from the others.

FROM THIS OBSERVATION, I lay it down as a rule, ſo far as theſe experiments can ſupport a general maxim, that when buds are to be planted, it is beſt to allow them the whole thickneſs of the branch, however ſmall the piece may be.

I LAID theſe pieces horizontally, with the bud uppermoſt; and the ſucceſs was as I have mentioned: it may be worth trying what would be the effect with the pieces planted perpendicular or obliquely, to give the bud a different direction from what it had in my pieces.

MARCH 10, 1757, I took off ſome healthy branches of the COMMON WILLOW and the WHITE WILLOW: part of theſe I cut into lengths as the Poplar, with one bud in the center of each piece; and from the other part I cut out the buds with a piece of the wood to each. I wiped the wounded parts of both dry, covered them with the dreſſing, and planted them in the ſame manner as the Poplar in all reſpects.

THE intent of this was to confirm the former experiment by other inſtances; and as the whole point was to try whether this power was or was not in nature, I again choſe ſubjects the moſt likely to ſucceed.

THIS experiment anſwered exactly as the former: all the buds which had pieces of the entire branches grew; and moſt of the others. It appeared plainly, that this power of producing trees and ſhrubs from ſhort pieces of their branches, in each of which there is a bud, is not repugnant to nature, nor limited to one kind: and this ſhewed farther, that the obſervation made in the other inſtance reſpecting the manner of the operation is true, namely, that the way to ſucceed beſt, is not to cut the buds out of the branches, but to cut thro' the branches, and allow each an entire piece, tho' it be ever ſo ſhort.

THESE were the experiments I made in the laſt Autumn, and the preſent Spring, in the propagation of trees by buds; and I invite and requeſt all Gardeners to join with me in proſecuting theſe trials upon ſcarce and otherwiſe valuable kinds.

ALTHO' this practice be new, it is founded in the moſt plain manner on reaſon and the nature of things. There is no more wonder that a bud ſhould produce an entire plant, than that a ſeed ſhould grow. Each of theſe contains the rudiment of an entire plant of its kind, and there requires only a proper care in the culture to ſet it to growing.

ing. We do not wonder that the little lumps upon the ſtalks of the Dentaria, the White Saxefrage, or the Scarlet Lilly, ſhould grow when put into the ground; and there is the ſame reaſon that theſe buds ſhould, for they contain, in the very ſame manner, the originals of future perfect plants.

We do not enough regard the uniformity of nature; and it is thence our wonder riſes. But there is yet another inſtance in the courſe of the Gardener's profeſſion, which agrees more exactly with the growth of the bud, than either the ſeed, or the little lump upon the ſtalk; this is the common claſs of bulbous roots. In all theſe what is called the bulb, is not a root, but a rudiment of a plant ſurrounded with a great many coats, or a thick ſubſtance, by way of defence from the injuries of the air. The roots of the plant are thoſe fibres which grow from its baſe. The bulb is formed every year, and a new one always ſucceeds that which had furniſhed the ſtalk and flower of the preceding ſeaſon. A bulb is an embryo plant, covered with films, and fleſhy matter, formed under ground upon the baſe of the root of a plant; a bud is an embryo ſhrub or tree, covered with films, and ſcales in the ſame manner, and formed in the free air upon the branches of the ſhrub. They are the very ſame in their nature and conſtruction, and in the end they are to ſerve.

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We ſee the bulb ſhoot up a perfect plant without ſurprize, why then ſhould we wonder that the bud will have the ſame ſucceſs? Cuſtom has made the one familiar to us; the other at preſent is new and ſcarce, there is no other difference.

NOTHING could appear ſo ſtrange as the producing plants from cuttings, when Lauremberg firſt propoſed it to the world, yet what is now more familiar? The growth of cuttings is of the ſame nature with this which is here propoſed; and there is reaſon to believe, that the propagation by ſingle buds will ſoon be as common: and probably with proper care it will ſucceed as well in all other trees and ſhrubs which have buds of a proper kind, as in thoſe here inſtanced. Many trees and ſhrubs are deſtitute of buds entirely; indeed thoſe from the hotter countries almoſt without exception; and in others there are ſome buds which are deſtined to the production of ſome one part of the tree alone, not of the whole: therefore they will not anſwer the purpoſe. The Alaternus and the Oleander, the common Syringa, and the Tamariſk, the Savin and the Senſative Plant, are inſtances, among many others, of trees and ſhrubs which have no buds at all, and therefore do not come within this courſe of propagation. The Alder has buds for leaves, which contain no rudiments of flowers, and therefore perfect plants could not be produced from them. In the Poplar there are diſtinct buds for the flowers, and others for the leaves; therefore if the flower-buds were taken, no ſucceſs could be expected. The Hazel has its buds, containing leaves and female flowers: the Pine and Fir male flowers and leaves together: how theſe buds would ſucceed, is a ſubject of great curioſity, and is worthy trial: but in general, the bud of a tree contains the rudiment of the perfect tree, and therefore a perfect tree may be produced from it.

This is the uſual condition of buds, and therefore in the generality of kinds, trees may be produced by this practice with great eaſe, and in great abundance. There is alſo, as I think, another very conſiderable advantage from this method, though the limited number of experiments I have named, does not permit me to affirm it with all the certainty of the other facts. This is, that the trees produced from buds, will naturally be handſomer and more vigorous than thoſe raiſed any other way except from ſeeds: for in layers there is a great interruption of the courſe of the juices; and in cuttings it is uncertain whence the principle of growth will begin to act, ſo that nature is diſturbed in her progreſs, and the juices receive a check in their current either of thoſe ways; the effect of which in nature, we ſee plainly in the growth of the Pine-apple, and many ſuch inſtances: whereas when the bud is planted, the ſucceeding tree riſes ſtraight from its natural place, and there is no turn given to the juices, nor any check in the growing. From the time the rudiment begins to grow, it continues growing; and while it lies in the bud, it is as much at reſt as the plant in the ſeed, till nature ſets it to ſhooting. Art does the ſame in this proceſs, and the effect is no way different; the tree grows juſt as the ſhoot would have grown on the branch. So many buds as there are on a tree, ſo many perfect trees of the ſame kind may be produced if the Gardener takes care of them, for each is a young tree, and no other.

At a certain diſtance from the root, the rudiments of leaves, inſtead of forming ſeparate leaves, like thoſe below, coaleſce in their origin, and form a cup; and at the ſame time, and by the ſame power, whatſoever it is, (for it is hidden from us in itſelf, tho' viſible in the effects) the rind and pith of the ſtalk, inſtead of continuing the growth in that form for the farther increaſe of the branch, break out into broad thin coloured parts and thready ſubſtances, and the reſt of the parts of fructification: a flower is formed, and ſeeds follow: that is, the plant ceaſes to grow in heighth and length of branches, for nature has given in that reſpect a certain law to all; and where its parts ceaſe to extend themſelves in length, they terminate in the rudiment of a new plant called a ſeed.

This is the courſe of natural vegetation. Now art taking its place, produces from the ground that ſhoot, by planting the bud, which in the common courſe of things would have been ſent from the ends of the branches. It would then have produced flowers and ſeeds when it had grown to a very ſmall length in this ſtate, becauſe the height of the ſtem, and the length of the branch whereon it grew, would have placed it at a due diſtance from the root: but when it is removed from this ſituation, and raiſed by planting the bud immediately in the ground, inſtead of forming only a ſhort branch, it produces an entire tree, becauſe the rudiments of leaves will never coaleſce into a cup, nor will the rind and pith form flowers and ſeed-veſſels until the allotted diſtance from the root is once obtained.

Linnæus, who adopts from Loeffling this doctrine of the ſtate of buds, ſays, He will give a great addition to the ſcience, who ſhall ſay what it is that influences the extremities of the plant to burſt out into flowers, and to form ſeeds. If I may offer my humble opinion, it is this: Nature has allotted to every plant, as to every animal, a certain growth or ſtature which it ſhould not exceed; and the cauſe of difference in that ſtature in various plants ſhe placed in their roots.

EVERY root, I imagine, has ſo much power as is neceſſary to carry up a plant to a certain height: then it ceaſes; and therefore there ends the immediate growth of the plant. When the branch can extend no farther, its parts all terminate; not abruptly, for that is not the courſe of nature in any thing, but each part, according to its kind, terminates in ſome one of the organs of the flower, and the reſult of all is a ſeed; which being put into the ground, will again grow and extend itſelf, becauſe it gets a new root.

THE plant can grow no higher, becauſe its root can furniſh no more force for the aſcent of ſap; but the termination of the parts is by a ſeed, that is a rudiment, which muſt be put into the ground, and will then get new root, and therefore grow again.

ART, and the practices of the Gardener, may interrupt and diſturb nature in theſe operations, and produce vegetable monſters; but this appears to be her regular courſe; and thus it is that a bud, which if it had opened on the tree, would have produced only a ſhort flowering branch, will, like the ſeed when planted in the ground, grow to the height of the original tree: for the power of the root it gives, is ſufficient for that purpoſe.

A ROOT is required for this, becauſe only the power of that organ can extend and increaſe the parts; but nothing more is wanting; for roots, like the Polypes and certain worms, have power even when cut to pieces to reproduce the ſeveral parts.

FROM theſe conſiderations may be underſtood all that appears wonderful in the production of plants from the bud, and conſequently from their other parts: and we ſhall ſee that what appears to be production or propagation, from the parts in general, is the ſame thing under another form: and that the raiſing plants by cuttings, is another way of operating by the bud, though not ſo regularly. If this be proved, it is certain that the taking a bud itſelf will be preferable to the ſetting it loaded with a part of a branch. The rudiment of a root will ſtrike more readily, when the bud wherein it is contained is placed immediately in the ground; and the courſe of the ſap will be plainer, ſhorter, and eaſier, than when it is to run through a long though uſeleſs branch. This is in ſome degree reducing the Gardener's art to its principles; and we ſhall always ſucceed the better, the more perfectly theſe are underſtood.

IF it be true, according to theſe remarks, that a bud is nearly of the nature of a ſeed,

there

there can be no doubt of its ſucceeding the better, the nearer we bring its management to the ſeed culture. Indeed there is in nature ſomething like an inſtance of it in the plant *Biſtort*. This produces bulbs upon the ſtalk, which are a kind of buds; and theſe uſually fall off, and take root; but ſometimes they will ſhoot upon the ſtalk. In the firſt caſe they produce perfect plants of the ſame kind, but in the latter always poor, irregular, and imperfect ones.

## CHAP. III.

## *Of the dreſſing of* CUTTINGS *with this cement.*

HAVING ſeen the good effect of this dreſſing upon the wounded part of theſe pieces of branches; that it certainly prevented their rotting in the ground, and by that means gave nature time to operate in the upper part of the branch; I reſolved to try its effect upon ſome cutting of thoſe tender exoticks, which are found commonly to fail. It appeared to me, that the only cauſe of this, was the rotting of the lower part of the cutting; and conſequently, that if this dreſſing could prevent that, it would ſecure the growth of the ſhoot.

Mr. Miller, in his Gardeners Dictionary, ſays, "Some have aſſerted the Coffee-"tree would grow from cuttings; but "that in all the different trials he had "made, he never could obtain one plant "that way." No body will doubt this author's experience, or that he knew how to manage his cuttings perfectly well: for this reaſon I fixed upon the Coffee-tree for the kind I ſhould firſt try in my new way.

November the third, 1757, I took off ſome cuttings of the Coffee-tree in the uſual way; I wiped the wounded parts very dry, and dreſſed them with ſome of the cement juſt melted ſo as to run. I planted theſe cuttings in pots in the common way, and ſet the pots up to the rim in the bark-bed in the ſtove.

As this was a point of importance, as well as curioſity, I did not think it juſt to risk the whole upon one trial; therefore,

November the 28th, I took off ſome more cuttings from a Coffee-tree, dreſſed them with the ſame care, and planted them in the ſame manner in pots, plunging them into the bark-bed in the ſtove.

April 20, I examined theſe cuttings, and found they were in a very healthy condition.

May 16, I again examined them, and they had ſhot ſix inches in height, and had got very good roots.

ON the 12th of DECEMBER I took off ſome ſlips of the Coffee-tree, wiped the wounded part, and dreſſed them with cement. I planted theſe in the ſame manner as the cuttings, and gave them the ſame care; they ſucceeded as well, but not at all better than the cuttings. They all furniſhed very good and healthy plants.

FROM theſe experiments it appears, that thoſe tender and precious ſhrubs and trees, which will not grow in the common way from cuttings, may be brought to ſucceed in this manner: and this is a very conſiderable uſe of the dreſſing here deſcribed. It is a nice and difficult article to hit the right ingredients and juſt proportions: many have failed in various operations, who uſed ſuch mixtures as were ill made up; but ours will certainly anſwer this and the former purpoſes, as well as many others, to be named hereafter.

THAT this effect of the dreſſing upon the cuttings of tender plants, might be confirmed or refuted by more inſtances,

APRIL 17, I took off ſome cuttings of the Orange and Lemon trees in the common method uſed in cutting: I wiped the raw ends very dry, and dreſſed them with the cement. I planted theſe in pots, and plunged them in the bark-bed in the ſtove.

MAY 28, I examined them, and found they had begun to ſhoot.

June 20, they had ſhot three or four inches, and got very good roots.

April 6, to confirm this practice by another inſtance, I took off ſome cuttings of the Double Oleander: I wiped the wounded parts, covered them carefully with the dreſſing, planted them in pots, and plunged them in the bark-bed in the ſtove.

May 29, I examined theſe: they had all done very well; every cutting had ſhot ſix inches, and they had all got very good roots.

April 12, 1758, I took off ſome cuttings of the Coffee-tree, wiped the raw part dry, and covered it carefully with the dreſſing; I then planted them in pots, and plunged them in the bark-bed in the ſtove.

May 30, I examined the pots; I found every one of the cuttings had formed a good and thriving plant: they had ſhot ſix inches in length, and had got good roots.

These experiments ſhew, that the dreſſing agrees equally well with the generality of plants, preſerving the lower part from decay, and by that means giving nature an uninterrupted courſe for the nouriſhment of the ſhoot above, and time to ſend out roots from the part below in the ſame manner; for when nouriſhment is received, and the vegetative principle is unimpaired, the ſhooting of roots from the part below the ſurface, is as natural as the ſending out of branches from above.

It is plain this uſe of the dreſſing may be of great benefit, ſince it will cauſe many plants to ſucceed by cuttings, which would not otherwiſe do that way at all; and will make others ſucceed freely and generally, which without this aſſiſtance would anſwer but ſeldom, and at the beſt but poorly. The preventing the decay of the bottom of the cutting, is the great article; for when that rots, it deſtroys the whole. The decay of this, is like a mortification in animal bodies, as ſoon as it has ſeized the part, it ſpreads and infects, and deſtroys all.

This decay in cuttings, is occaſioned by the moiſture of the ground which affects the raw part; but if that be guarded from the miſchief, nature does all the reſt. The Gardener need only prevent the decay of the cutting, the growth will follow without his aſſiſtance.

But though the effect of the dreſſing for this purpoſe is general, it is not univerſal: though it will anſwer with moſt plants, it will not do with all. This I have found by the like experiments, and it becomes me to acknowledge it: phyſicians have done the world as much ſervice by giving accounts of diſeaſes wherein remedies failed, as of thoſe in which they ſucceeded; and I would

not

not ſerve this cauſe, even by ſilence, where it failed.

April 19, I tried it on the Senſitive plant. I took off ſome cuttings with great caution, being ſenſible how difficult it would be to make them ſucceed: the pots were ready with excellent mould, and the dreſſing on the fire: I wiped the raw ends dry, covered them carefully with the cement, and planting them with all poſſible care, plunged the pots into the bark-bed in the ſtove. They all died.

Willing to make another trial, that I might be ſure wherein this method failed, as well as where it ſucceeded, on the 28th of May I dreſſed another parcel of cuttings of the Senſitive plant in the ſame manner, uſing, if poſſible, more caution than at firſt, that they might have every poſſible advantage. July 29, I examined the pots, and theſe were alſo all entirely dead.

In experiments on raiſing the Senſitive plant by cuttings, therefore this method fails; but it is the only plant on which I have hitherto found it ineffectual.

It is plain therefore, that the uſe of this method will be extremely beneficial, not only for the raiſing plants from buds, but alſo from cuttings. That ſtrange writer Agricola, who firſt propoſed this kind of propagation, has diſgraced his work by many falſhoods; and for that reaſon, what was true and uſeful in it, was long neglected; neither had he the ſecret of a good cement, nor the great advantages of ſtoves: ſo that while, on the one hand, he has ventured to aſſert much more than is true, on the other he had not opportunities of knowing all that could be done by it.

THAT author has aſſerted that trees may be produced from leaves. He ſays, the tender part between the ribs decays, and the fibres grow up into branches: he has even given relations, and figures of Orange and Lemon trees, and many others, which he ſays he raiſed in this manner. Though there was little probability of truth in theſe accounts, yet being upon the ſubject, I reſolved to give this alſo a fair trial, uſing on ſome leaves of each kind the cement he directs, and on others my own. The reſult will be found in the following chapter.

## CHAP. IV.

### EXPERIMENTS *on* LEAVES.

NOVEMBER 3, 1757, I picked four dozen healthy leaves of the common Laurel: I took them carefully from the tree with no buds joining to them: I ſmoothed the end when they were pulled off with a ſharp knife, wiped it dry, covered it with the dreſſing; and thus preparing them all, I planted them in four middle-ſized garden-pots, one dozen in each. Two of theſe were expoſed to the air, the one under a ſouth wall, the other without that ſhelter, nd both ſet up to the rim in mould; a hird I ſet in the green-houſe, and the fourth ot I plunged in the bark-bed in the ſtove. This laſt place was choſen to promote the hooting of the fibres, nothing having ſo reat power for that purpoſe.

THAT the determination of this point ight not reſt upon one ſet of experiments ade at only one ſeaſon, APRIL 12, 1758, I took off two dozen more leaves of Laurel, ith the ſame precaution: I dreſſed them n the ſame manner, and planted them in ſhady border.

MAY 29, 1758, I took off a third parcel f Laurel leaves, and dreſſing them as the thers, planted them alſo in a ſhady border.

AT the ſame time I examined thoſe of e NOVEMBER planting, and found them ll dead in all ſituations.

APRIL 19, I took off ſome healthy leaves f Orange and Lemon trees; cut the raw nds ſmooth, wiped them dry, covered them ith the cement, and planted them with all oſſible care in pots of good mould, and lunged them in the bark-bed in the ſtove.

FROM time to time I gave theſe all oſſible advantages for promoting their rowth.

MAY 29, I examined them; they were all dead, without any attempt to ſhoot out fibres.

MAY 30, I ſelected another parcel, prepared and planted them with the ſame care, and gave them all the poſſible advantages for growth.

JULY 29, I examined them, and found them all dead; no one having made any attempt to ſhoot out any fibres.

THAT this might not reſt upon one ſpecies in the ſtove, I determined to try alſo the Coffee-tree.

APRIL 27, I took off ſome very fine and freſh leaves from a healthy Coffee-tree, ſmoothed the raw ends, covered them with cement, and planted them in pots. I ſet theſe in the bark-bed in the ſtove, gave them all the ſame advantages with the others, and on ſearching them, MAY 30, I found them all dead.

DURING the courſe of this experiment, on the 16th of MAY I took off another parcel of the Coffee-leaves, dreſſed them with the ſame care, and planted them in the ſame manner.

JUNE 27, I examined them, and found them all dead.

ALL this time the Laurel-leaves of the ſeveral Spring plantations remained in the ground; and I beſtowed on them the common care, being determined to omit nothing

thing that might give fair play to the experiment; nor to take up any leaf till it ſhould be evidently dead.

August 26, 1758, I examined carefully thoſe leaves which had been planted in April, May, and June, removing the mould a little from them. It is certain ſome of them have ſhot a few fibres from the lower part of the foot ſtalk. What will be the reſult, is impoſſible to ſay; the proſpect of ſucceſs is very little; but the queſtion is not fully decided.

## CHAP. V.

## *Of* PROPAGATION *of* TREES *by parts of the* ROOTS.

FROM the ſucceſs of the method of propagation by ſmall pieces of the branches of trees, it is natural to conceive that ſmaller or larger pieces of the roots will anſwer the purpoſe; and the ſame author who has treated of the laſt experiment, mixing truth with falſhood, has named alſo this.

REASON is very fairly on the ſide of the experiment. We ſee that roots, wherever they reach the ſurface of the ground, ſhoot up into young trees; and we find, by manifold experience and obſervation, that the difference between roots and branches, is little more in nature, than that the one are buried under ground, the other kept above it. This new method of propagation depends upon one principle, namely, that the rudiments of new plants are lodged in all parts of the old, and are ready to grow from them to perfection, whenever they have proper advantages. Therefore it ſhould appear to reaſon, that if a piece of a root can be kept from decaying in the earth, it will produce one or more new plants. This I propoſed to try by the following experiment:

November 3, 1757, I raiſed carefully by opening the ground, a large horizontal root of the Willow-leaved Buckthorn. I trimmed off all the ſide ſhoots; and cutting the two ends ſmooth, wiped them perfectly dry, and covered them with the dreſſing all over the raw parts; not only the two ends, but the ſeveral places alſo from whence I had cut the ſide ſhoots and large fibres. I opened a trench in a bed in the nurſery long enough to receive the whole piece, and laid it in horizontally, and covered it an inch deep with mould, not raiſing a ridge over it, but keeping the place on a level with the reſt of the bed.

April 12, I examined this ground, and found a great many ſhoots riſing up at different diſtances from the whole length of the root.

April 30, many of the ſhoots have got ſix inches high, and all appear very vigorous.

May 20, ſeveral of the ſhoots are a foot long, and promiſe to make very ſtrong and fine plants.

June 27, I took up the entire root, and cut it into as many pieces as there were good ſhoots: thus every young plant had a piece of the large root for its baſe, and a multitude of ſmall fibres newly ſhot.

I wiped the two raw ends of every piece, covered them carefully with the dreſſing, and juſt trimmed the extremities of the new fibres.

I planted them in a ſhady border in the nurſery, and occaſionally watered them. I have ſo many fine plants. Theſe ſeemed in danger at the firſt removal, and I believe it would be better hereafter, when plants are thus raiſed, to let them ſtand till the next Spring before they are moved.

To try whether the roots of trees would not produce new ſhoots as well when cut to pieces, as in the entire length,

November 3, the ſame day with the firſt experiment, I took up another root of the ſame ſhrub, and cut it into pieces of two or three inches in length; I ſmoothed the raw ends of each piece, took off the ſide ſhoots, and covered the two raw ends, and all the ſmall wounds made by taking off the fibres, with the dreſſing. I planted them, at the ſame time, with the entire root in the nurſery, and gave them the ſame care. The ſucceſs was the ſame.

June the 28th, they had all ſhot up one or more new plants. I took them up, took off all but the beſt ſhoot, and planted them in the nurſery, where they are now growing. That this experiment might not reſt upon one trial, or ſeem appropriated only to one plant; one the ſame day, 3 November 1757, I took up two roots of a Virginian Acacia, which was in good health, and could ſpare them without danger. One of theſe I dreſſed entire, the other I cut into pieces of two or three inches long; and covering all the wounds with the cement, I planted them in the ſame manner as the others, in an open part of the nurſery, laying them lengthwiſe in a ſhallow trench, and covering them an inch with mould.

In froſty weather I threw a little peas-haulm over the ground.

April 24, I examined the ground, and found young plants riſing from almoſt all the ſmall pieces of the root, and a great many from the entire one.

May 20, I had from theſe roots a great many fine plants of a foot or more in height.

June 27, I took up the large root, and cut it into as many pieces as there were good plants: I wiped theſe dry at the ends, and covering them with cement, planted them out in the nurſery. They ſucceed very well; but required care at firſt. It will be beſt to let theſe plants all ſtand till the next Spring before they are removed.

To try whether the root would ſucceed beſt naked, or with the fibres about it, the ſame day, NOVEMBER 3, 1757, I planted a root of the Sallow-thorn, and another of the Virginian Acacia with their fibres. Theſe are no hindrance, and they appear to me to be an advantage. The great point is ſecuring the root from decaying at the two wounded ends; for if that be prevented perfectly, nature will do all the reſt.

THE preſſing down the mould about the root when firſt planted, is a very neceſſary caution; and in the courſe of the experiment, the place muſt be kept moiſt with due waterings. According to the more or leſs hardy nature of the ſhrub, the root will require more or leſs ſhelter and defence in winter; and with this management there is no doubt of perfect ſucceſs.

AT the ſame time that I made theſe experiments on the roots of European and American ornamental ſhrubs, I was determined to try it alſo on fruit-trees.

NOVEMBER 3, 1757, I took up two long pieces of the ſpreading roots of an Apple-tree, beginning at ſome diſtance from the ſtem; and opening the ground all along, that I might get up the extreme part of the roots, with their ſmall diviſions. One of theſe I cut into lengths, and the other I left entire, not cutting off the ſide ſhoots or fibres from either. I ſmoothed the wounded ends with a ſharp knife, and covered them perfectly with the dreſſing or cement juſt made warm.

I opened a trench in a bed of the nurſery, and laid them in, covering them an inch over the upper part, with mould preſſed well down in every part about them. I allowed theſe the ſame care as in the former inſtances, and they ſucceeded as well.

April 7, 1758, I examined the ground; ſeveral young plants appeared both from the entire roots and the pieces.

May 20, 1758, many of the new plants had ſhot a foot high, and were very vigorous and promiſing.

July 27, I took up the entire root, cut it into as many pieces as there were good plants; and wiping their raw ends dry, covered them with cement, and planted them out in the nurſery.

They prove very good plants.

The pieces of the root planted at the ſame time ſucceeded alſo very well; and having been tranſplanted into the nurſery, are now good plants.

At

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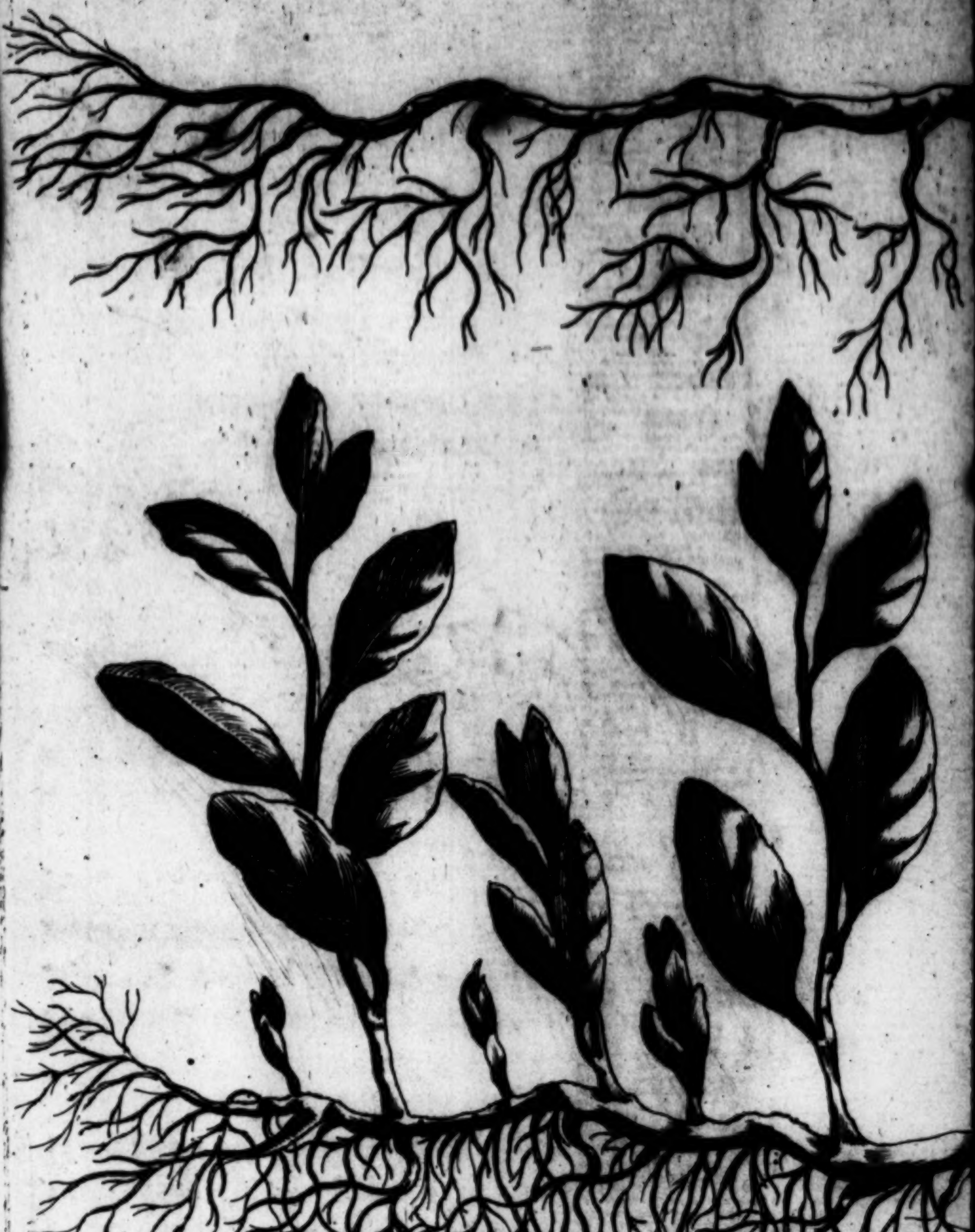

*Propagation by the Root*

At the ſame time, November 3, 1757, I took up two handſome pieces of the root of a Pear-tree, and managed them in the ſame manner exactly, as thoſe of the Apple-tree in the former inſtance. They were planted in the ſame manner, and had the ſame ſucceſs. That which had been laid in the ground entire, I cut in July into as many pieces as there were good plants upon it, and the others I trimmed of all ſhoots but one to each. The wounded parts I wiped dry, and covered with cement, and planted them in the nurſery with the common care, they are all now thriving plants.

That this experiment, which may be uſeful to Nurſerymen, and all who deſire to raiſe a great number of plants, might not reſt upon ſo few kinds, I extended it at the ſame time to ſeveral other trees and hrubs.

November 4, 1757, I cut off ſome roots of the Elm, the Oak, the Cherry, the Plumb-tree, the common White-thorn, and the Platanus: ſome of theſe I planted in the whole lengths, and others in each kind I cut into ſhort pieces, covering with cement the wounded parts, and planting them in the ſame manner as thoſe before mentioned, and the ſucceſs was alſo the ſame.

April 30, I examined the ground, and found they had all ſent up vigorous ſhoots.

May, 26, moſt of them had ſhot a foot or more in length, and were very promiſing plants. Theſe I treated in the ſame manner as the preceding; and as many of them as I choſe to preſerve, are now fine plants.

I am of opinion, however, in regard of theſe as well as the others, that if they had been ſuffered to remain till the next Spring before they were removed, they would have done better, and with leſs trouble.

## CHAP. VI.

### *Of* Propagation *by large* Branches.

The ſame kind of reaſoning, which led us to believe that the roots, or pieces of roots, would raiſe young plants, being very naturally extended to the branches, I was determined to try what would be the ſucceſs upon experience. The difference between roots and branches being very little, the ſame method may be uſed for one as for the other.

November 12, 1757, I took off a branch of an apple-tree, and rubbed away ſo many of the buds, as to leave them only at three inches diſtance, or thereabout, and as much as could be all on one ſide of the branch. I ſmoothed the end, wiped it dry, and covered it with the cement, as alſo the places where the buds had been rubbed off. Thus prepared, I laid the branch in a trench opened in the nurſery, in a bed of good mould, and covered it an inch, preſſing the mould very well about it.

April 27, 1758, I examined the ground, and found a great many very fine plants coming up.

May 26, they had ſhot ſix or eight inches, and got good roots.

June the 12th, the plants being all very vigorous, I took up the branch, cut it into as many lengths as there were plants, covered both ends with cement, and planted theſe in a ſhady bed in the nurſery.

June 30, I examined the plants, by removing a little of the mould, and found they had got freſh root. They ſucceed very well; but probably would have done yet better, if left in the ground with the entire branch till the ſucceeding Spring.

At the ſame time that I began theſe laſt experiments on the Apple-tree, I tried alſo the Pear.

November 12, 1757, I cut off a handſome branch of a Pear-tree, rubbed off a part of the buds, and ſmoothing the wounded end with a ſharp knife, I covered it with the cement, as alſo the places where the buds were rubbed off. I planted this in the ſame manner as the other, and with the ſame ſucceſs.

June 12, I took up the branch, cut it into as many lengths as there were good ſhoots, and planted them out in the nurſery, cementing firſt the two wounded ends. They are all now living, and are thriving plants.

To extend this experiment to other kinds of ſhrubs and trees, I made choice of the Sallow Thorn, Elm, and the Virginian Acacia. The reſult was different; and I ſhall give it ſeparately.

November 9, 1757, I cut off a branch of the Sallow Thorn, or Sea Buckthorn, rubbed off a part of the buds, ſmoothed the wounded end with a ſharp knife, and covered that part, and the places where the buds had been, with melted cement. I planted this in a trench in the nurſery, in a bed of good mould, as the others.

April 7, ſeveral very good plants appeared.

May 20, I cut the branch into ſeveral pieces, each having a good ſhoot; and covering the two wounded ends with cement, planted them in another bed. They are all now good and healthy plants.

April 20, 1758, I cut off in the ſame manner ſome branches of an Elm-tree, and planted them with the ſame caution in a ſhady border of the nurſery.

June 29, I examined the ground: they had all taken root, and there were a great many good ſhoots from them.

NOVEMBER 15, 1757, I cut off a good branch of the Virginian Acacia, ſmoothed off the wounded end, wiped it very dry, and covered it with melted cement. I planted this in the ſame manner, and with the ſame care as the other, covering the ground in froſts with peas-haum, and removing it when milder.

APRIL 30, I examined the ground; nothing was ſeen coming up; but on removing a little of the mould, the branch appeared to be alive.

JUNE 2d, I examined it again: the branch was quite dead, and there had been no appearance of any ſhoot from it.

THIS method by the branches of trees, is but a different way of raiſing by the bud, but we ſee it is not univerſal; though it will ſucceed with the far greater part of plants. The Gardener may underſtand by this, that when he would try a new method of any kind whatſoever, he ſhould not limit his experiments to one ſort of plants, nor be diſcouraged at their failing in one ſpecies. It is plain, that the ſame method may be ſucceſsful in one inſtance, which fails in others.

As to the branches and pieces of branches laid horizontally in the ground, they will thus produce plants of a good kind; ſo will at any time pieces of them, cut to a proper

length,

length, ſecured from rotting in the wounded parts, and placed in an erect poſition.

FEBRUARY 6, 1758, I cut off ſome ſhoots of an Apple-tree a foot long, and took a piece of the old wood with them, I ſmoothed the raw parts, covered them with cement, and planted them in a bed in the nurſery, at ſix inches diſtance, leaving only an inch of the ſhoot above the ground. I gave them the common advantages of new planted things, and watered the bed at times.

MAY 27, I examined theſe; they had all ſucceeded perfectly well; they had taken good root, and ſhot about ſix inches in height.

MARCH 7, 1758, I repeated the experiment upon ſome ſhoots of the Pear-tree. I cut theſe off, in the ſame manner, at about a foot long, and took a piece of the old wood with each. I ſmoothed the ends, covered them with the cement, and planted them in the ſame manner in a bed in the nurſery.

MAY 26, I examined them; they had all ſhot about ſix inches in length, and had got very good roots. They are now ſo many very fine plants.

THAT this experiment might not be limited to the fruit kinds, I choſe the common Elm for another inſtance.

FEBRUARY 6, 1758, I cut ſome ſhoots of the Elm in the ſame manner, with a piece of the old wood to each: I ſmoothed the raw ends, and covered them with cement, and planted them exactly as the others, in a bed in the nurſery.

MAY 27, I examined the ground, and found they had all ſhot five or ſix inches in height, and were ſtout and flouriſhing plants, having all good roots.

THIS tends to confirm the general doctrine upon which theſe experiments were all eſtabliſhed; which is, that any part of a tree which can be preſerved from rotting when in the ground, will ſend up a new plant of the ſame kind; and that the danger of decay is not in any of the parts covered with the bark, but only in thoſe which have been new wounded. It appears that the cement or dreſſing here directed, will preſerve thoſe parts; and therefore that by its means trees and ſhrubs may be produced from all their parts.

I SHALL cloſe this little work, by a method not altogether of the ſame kind with theſe; but as it will ſucceed in ſeveral caſes, where the common ways fail, it may not be unworthy of the notice of Gardeners.

CHAP.

## CHAP. VII.

## *A Way of raiſing* TREES *from the* ROOT.

TO raiſe a new plant from the root of thoſe kinds which will not take as layers, or grow from cuttings, I uſe this method: I lay open the earth over one of the roots of a thriving tree, of half an inch diameter, or more, according to the nature and growth of the tree: in ſmall and tender trees, ſmaller roots will do. I raiſe this out of the ground, cutting it two-thirds through, and trim off all the ſide fibres for about ſix or eight inches of the root: then I dreſs all the wounded parts with the cement juſt warmed, and keep the wounded part of the root for about five inches length out of the ground, ſupporting it by a forked ſtick.

THUS it has the advantage of its own fibres, and of the general vegetation and growth of the tree, all the time that it is thus kept up above the ground. It has been ſaid before, that the branches and roots of trees differ in nature no other way, than as the one are under ground, and the other in the open air; and therefore this part of a root being raiſed into the air, what grows from it will be of the nature of a branch or

ot, not of a root. The Spring is the
t ſeaſon for doing this; and if due care
uſed, it will always ſucceed. There will
young ſhoots produced from the part that
in the air. Theſe ſhould ſtand till the
xt Spring to be well eſtabliſhed, and they
y then be cut off, and will readily and
tainly ſucceed.

I HAVE raiſed in this manner plants of
e Double Oleander, the Cotton-tree, and
ſeveral other kinds, the moſt difficult to
raiſed by the uſual methods of culture.

THUS have I laid down what experience
s ſhewn me, upon frequent and repeated
als, relating to the methods propoſed by
hers, and uſed in my own practice, for
ſing valuable trees in abundance, and in
expeditious method; and I hope my
other Gardeners will find the advantage.
hey may indeed do much more; for tho'
e experiments I have made amount to ſe-
ral hundreds, yet they have been limited
only a few ſpecies out of that almoſt in-
nite variety nature has thrown before us.
heſe experiments may be eaſily repeated,
theſe kinds, and new ones may be made
pon the ſame principles. Perhaps alſo
e few I have made unſucceſsfully, may,
the hands of ſome others, be crowned
ith ſucceſs, for nature is very various;
d the event of experiments frequently de-
ends upon little circumſtances in particular

[illegible]

[illegible] may, perhaps, ſtill keep [illegible]

ſtop under ſome glaſs jar [illegible] the air.

Indeed, as the great queſtion relating

the Spinach by leaves, is not yet decid

I ſhall with care obſerve, and mark [illegible]

thoſe which at the publication of this li

work ſeem to give tokens of life, and the

ſome roots. I ſhall alſo report the expe

ments on various plants leaves, [illegible]

curious will join me in theſe trials. [illegible]

thing ſeems ſtrange; but who can ſay, wh

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experiments I have made amount to ſe-
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only a few ſpecies out of that almoſt in-
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th theſe leaves, and new ones may be made
on this ſame principle. Perhaps many
few I have made unſucceſsfully, may,
the hands of [illegible] others, be crowned
h ſucceſs; for nothing is very difficult
the event of experiments frequently de-
nds upon little circumſtances in particular
caſes

C